

1           METHOD AND DEVICE USING HIGH INTERIOR PRESSURE  
2                   TO RESHAPE STRUCTURAL SECTION

3   The present present invention relates first, to a method  
4   using high interior pressure to reshape structural section  
5   as recited in the preamble to Claim 1, and second, to a  
6   device as recited in the preamble to Claim 5 for carrying  
7   out the method.

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9   The structural section being reshaped using high internal  
10  pressure may be tubing as disclosed in German 3 923 358 A1  
11  and in US 4 414 834 A. Pieces with a non-circular cross-  
12  section, however, can also be reshaped. Such material is  
13  usually extruded.

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15  To ensure unobjectionable fluid tightness, a stopper is  
16  forced radially against each end of the structural section.  
17  The end of the piece rests against an edge of the stopper,  
18  creating a seal. To reduce wear on the stoppers as much as  
19  possible, the seal-creating edge is made of a wear resistant  
20  material and is forced against the interior surface of the  
21  section subject to relatively high pressure.

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23  It would also be desirable to similarly use high interior  
24  pressure to reshape pieces with extra walls or chambers

1 projecting into or out of their overall cross-section. There  
2 is, however, a drawback to such a procedure in that the  
3 walls or chambers tend to deform axially along the piece,  
4 allowing the edges to buckle or bulge out axially undefined.  
5 It is of course possible to counteract this tendency by  
6 making the edges of a softer material. This approach,  
7 however, increases wear on the edges.

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9 The object of the present invention is accordingly a method  
10 of and a device for using high interior pressure to reshape  
11 structural section with walls or chambers that project into  
12 or out of its overall cross-section, whereby the stoppers  
13 are subjected to low wear and whereby the extra walls or  
14 chambers will buckle or bulge out only at their ends.

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16 This object is attained by the characteristics recited in  
17 Claims 1 and 5. Practical and advanced embodiments are  
18 addressed in Claims 2 through 4 and 6 through 9.

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20 The major advantage of the present invention is that complex  
21 structural section with extra walls or chambers can be  
22 reshaped using high interior pressure, decreasing the cost  
23 of manufacture. Since the section is reshaped only slightly

1 at the ends, they will need to be trimmed only slightly if  
2 at all as the material is further processed.

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4 One embodiment of the present invention will now be  
5 specified with reference to the accompanying drawing,  
6 wherein

7 Figure 1 is a view of one end of a length of extruded  
8 structural section with several walls,

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10 Figure 2 is a larger-scale view of detail II in Figure 1,

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12 Figure 3 illustrates a stopper sealing off the end  
13 illustrated in Figure 1,

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15 and

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17 Figure 4 is a larger-scale view of detail IV in Figure 3.

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20 Figure 1 depicts a length of typical extruded structural  
21 section that is to be reshaped using high interior pressure.

22 The extrusion has a continuously bounded cross-section 1

23 partitioned by two walls 2 and 3 into three chambers 4, 5,

1 and 6. Finally, the section is provided with an independent  
2 wall 7 that extends out of cross-section 1.

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4 While it is being reshaped and still inside the reshaping  
5 tool, the ends of the piece are sealed by stoppers 8 forced  
6 radially against them. Each stopper 8 is provided with a  
7 seal-creating edge 9 established on the surface of a gasket  
8 10 that rests against the stopper. Each edge 9 accordingly  
9 fits tight into the structural section. Each stopper 8 is  
10 provided with aligners 11, 12, and 13 that more or less fit  
11 into chambers 4, 5, and 6, which they enter into as stopper  
12 8 is advanced toward the piece. Partitioning walls 2 and 3  
13 and overall cross-section 1 are accordingly secured  
14 radially, the overall piece being introduced against and  
15 correctly positioned in relation to each stopper 8. Gasket  
16 10 and aligners 11, 12, and 13 can now attach the  
17 schematically illustrated connectors 14, 15, and 16 to  
18 stopper 8. Connectors 14, 15, and 16 can also convey the  
19 fluid that provides the reshaping pressure.

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21 To ensure a well controlled buckling or bulging out by walls  
22 2, 3, and 7, they are provided with slots 17 more or less  
23 paralleling the inner surface 18 or outer surface of cross-  
24 section 1. The slot 17 in the illustrated example is very

1 near inner surface 18. These slots are preferably produced  
2 by an appropriately shaped bit on stopper 8 as the stoppers  
3 are brought together.

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5 Figure 4 illustrates an alternative or additional embodiment  
6 of the present invention. Gasket 10 is in this embodiment  
7 provided with grooves 19 extending along the walls 2 and 3  
8 that partition cross section 1. Grooves 19 allow  
9 partitioning walls 2 and 3 to stretch axially without  
10 buckling or bulging as the section is reshaped. Since the  
11 independent wall 7 that extends out of cross-section 1 does  
12 not rest against stopper 8, the measures addressing this  
13 wall in the foregoing will obviously not be necessary. What  
14 is on the other hand essential is that grooves 19 do not  
15 extend all the way to edge 9, providing the overall  
16 structural section with a well defined continuous seal.

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| 1  | <u>List of parts</u>     |
| 2  | 1. overall cross-section |
| 3  | 2. partitioning wall     |
| 4  | 3. partitioning wall     |
| 5  | 4. chamber               |
| 6  | 5. chamber               |
| 7  | 6. chamber               |
| 8  | 7. independent wall      |
| 9  | 8. stopper               |
| 10 | 9. seal-creating edge    |
| 11 | 10. gasket               |
| 12 | 11. aligner              |
| 13 | 12. aligner              |
| 14 | 13. aligner              |
| 15 | 14. connector            |
| 16 | 15. connector            |
| 17 | 16. connector            |
| 18 | 17. slot                 |
| 19 | 18. inner surface        |
| 20 | 19. groove               |
| 21 |                          |
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